

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 36

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TOSHIMOTO KODAIRA,
HIROYUKI OSHIMA,
and TOSHIMOTO MANO

Appeal No. 1996-0810
Application 08/259,354¹

HEARD: September 14, 1999

¹ Application for patent filed May 3, 1994, entitled "Liquid Crystal Display Device," which is a continuation of Application 08/014,053, filed February 5, 1993, now U.S. Patent 5,365,079, issued November 15, 1994, which is a continuation of Application 07/803,699, filed December 4, 1991, now abandoned, which is a continuation of Application 07/484,466, filed February 22, 1990, now abandoned, which is a continuation of Application 07/285,292, filed December 15, 1988, now abandoned, which is a continuation of Application 06/894,432, filed July 16, 1986, now abandoned, which is a continuation of Application 06/489,986, filed April 29, 1983, now abandoned.

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Before BARRETT, FLEMING, and HECKER, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 44-60 and 63-68. Claims 61 and 62 were indicated in the Examiner's Answer to be objected to as being dependent upon a rejected base claim, but as being allowable if rewritten in independent form. Appellants' Supplemental Amendment After Final Rejection (Paper No. 26) putting claims 61 and 62 in independent form as claims 69 and 70 has been entered and claims 69 and 70 are noted to be allowable (Paper No. 27).

We reverse.

BACKGROUND

The disclosed invention is directed to a liquid crystal display device and, in particular, to a structure to prevent line fault damage at the intersection between the source lines and gate lines which could be caused by, for example, static electricity. The structure includes first and second layers of electrically non-conductive material between the

gate lines and the source lines at the cross-over points, thereby forming a cross over capacitor with a capacitance per unit area less than the capacitance per unit area of the display capacitor. That is, the combined thicknesses of the insulating layers at the cross-over point is greater than the thickness of the insulating layer between the electrodes of the display capacitor. This structure provides a higher breakdown voltage at the intersection than at the display capacitor.

Claim 44 is reproduced below.

44. A liquid crystal display device, comprising:

a first substrate;

a plurality of switching elements supported by the first substrate;

a plurality of picture elements supported by the first substrate, each of the picture elements coupled to one of the switching elements and including a liquid crystal driving electrode, a display capacitor electrode opposed to the driving electrode and a first layer of insulating material between the driving electrode and the capacitor electrode, the driving electrode, the first layer of insulating material and the capacitor electrode forming a display capacitor with a first capacitance per unit area;

a gate line and a source line coupled to each switching element, the gate lines intersecting and crossing the source lines at cross-over locations and a first and a second layer of cross-over electrically

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non-conductive material located between each source line and gate line at the cross-over locations, each opposed source line and gate line with the first and second layers of cross-over electrically non-conductive material therebetween forming a cross over capacitor with a second capacitance per unit area and the capacitance per unit area of the cross over capacitor is less than the capacitance per unit area of the display capacitor; and

a second substrate opposing the first substrate and a quantity of liquid crystal material therebetween.

The examiner relies on the following prior art reference:

Ota et al. (Ota)	4,332,075	June 1,
1982		
	(filed May 22, 1979)	

Claims 44-60 and 63-68 stand rejected under 35 U.S.C. § 102(b) as being anticipated by, or, in the alternative, under § 103 as being unpatentable over Ota.

We refer to the Final Rejection (Paper No. 9), the Examiner Interview Summary Record (Paper No. 12), the several Advisory Actions (Paper Nos. 15, 17, 20, and 21), and the Examiner's Answer (Paper No. 23) (pages referred to as "EA__") for a statement of the Examiner's position and to

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the Revised Appeal Brief² (Paper No. 29) (pages referred to as "Br__") and the Reply Brief (Paper No. 24) (pages referred to as "RBr__") for a statement of Appellants' arguments thereagainst.

OPINION

Appellants argue that Ota does not render anticipate or render obvious "the claimed liquid crystal device having a display capacitor with a first capacitance per unit area and a cross-over capacitor with a second, lower capacitance per unit area" (Br5) because "[Ota] instead has equal capacitances at the cross-over locations and display capacitor" (Br6). Appellants provided a Declaration Under 37 CFR § 1.132 by David D. Meyer (attached to the Amendment After Final Rejection, Paper No. 14) explaining why Ota discloses that the capacitance per unit area of the cross-over capacitor and the display capacitor are the same.

The Examiner finds that "the capacitance of the cross-over capacitor is less than the capacitance of the

² The Revised Appeal Brief is identical to the original Brief filed July 21, 1995 (Paper No. 22), except that it includes statements regarding the real party in interest and related appeals and interferences.

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display capacitor because the semiconductor layer is not present in the display area" (unnumbered page between EA2 and EA3). The Examiner presents the following new arguments, which were not contained in the Final Rejection (unnumbered page between EA2 and EA3 through EA3):

From figures 3,4,5,and [sic] 7 it is evident that the semiconductor material 2,9 is located at the cross-over area and transistor area but is not located over the display capacitor area 5. See figure 3 where the display capacitor area is delineated by numeral 5. See also figure 7 where clearly the semiconductor layer 2 does not extend over the display capacitor area which takes up most of the device space as shown in figure 3 at numeral 5. The semiconductor layer does not extend over the display capacitor area because the device would not function as intended if it did. The semiconductor layer would block light and thus the display would not display. Appellant's arguments regarding the process of Ota are unconvincing because the figures of Ota clearly show that the semiconductor layer is present at the cross-over area and transistor area but is not present at the display area. . . . Light has to be transmittable through the display capacitor area. It would have been ridiculous to have engineered an opaque semiconductor layer over the transparent display capacitor. The device would not work.

Appellants traverse the Examiner's new points of arguments in the Reply Brief.

We agree with Appellants that the Examiner's findings and interpretations of Ota are in error.

Ota does not show the display capacitor in the drawings, as indicated at column 4, lines 40-42, and column 5, line 45. The Examiner errs in stating that figure 3 shows a display capacitor 5; element 5 is the drain electrode forming the claimed "liquid crystal driving electrode." Thus, the Examiner errs in relying on the drawings for a showing that the semiconductor layer 2 does not extend over the display capacitor. Presumably, part of the area of electrode 5 will be used for the capacitor, since it appears that the capacitor must be formed on top of the transparent electrode instead of below the transparent electrode as in Appellants' invention.

As Ota and the declaration of Mr. Meyer point out, Ota discloses that a semiconductor layer is deposited in the third step, an insulating layer is deposited in the fourth step, the insulating layer is masked and selectively etched away in the fifth step, the semiconductor layer is etched away in the sixth step, a second electrode material of metallic aluminum or chromium is deposited in the seventh step, and the second electrode layer is photoetched in the eight step to form the capacitor electrode (col. 5,

lines 41-45). The only way the Examiner could be correct about the semiconductor layer not being present at the display capacitor is if the semiconductor layer was etched away in the region of the capacitor before depositing the insulating layer. This was apparently the Examiner's position at the interview (Br6). However, Ota does not disclose etching the semiconductor layer before depositing the insulating layer or depositing only an insulating layer. We agree with Appellants that "Ota indicates that the semiconductor material is not etched until the sixth step, after the insulating layer is deposited in the fifth step" (Br6).

The Examiner's assertion that the semiconductor layer can not extend over the display capacitor area in Ota because otherwise the semiconductor layer would block light and the display would not display is thoroughly rebutted in Appellants' Reply Brief. We agree with Appellants that the Examiner apparently believes that if Ota included an optional display capacitor, the display capacitor and the display electrode (drain electrode 5) would cover the same area. Appellants first point out that "only a small portion

of the pixel electrode acts as a second electrode of the display capacitor" (RBr3) and "[t]he display capacitor is not included within the display area of the pixel electrode" (RBr3). Appellants secondly point out that "the top electrode of the display capacitor of Ota is formed from a non-transparent metallic aluminum or chromium material" (RBr4). Therefore, the display capacitor is non-transparent, which indicates that the Examiner erred in stating that the device would not work if the display capacitor had an opaque layer. We find both of these reasons persuasive of error in the Examiner's finding of anticipation.

We further agree with Appellants' argument that the Examiner has failed to set forth a prima facie case of obviousness by making a finding of the differences and stating why it would have been obvious to modify Ota. We find no motivation in Ota to modify Ota to reach the claimed invention.

For the reasons stated above, the rejections of claims 44-60 and 63-68 under §§ 102(b) and 103 are reversed.

REVERSED

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	LEE E. BARRETT)	
	Administrative	Patent Judge)
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)	BOARD OF
PATENT			
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	Administrative Patent Judge)	AND
)	INTERFERENCES
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